

REMARKS

Claims 1-8 are currently pending in this application.

Claim 1 has been amended to clarify that, when a complex between the optically active substituent and a primary amine is formed, a charge transfer from a receptor site to the polymer main chain is caused, thereby resulting in a quenching of the fluorescence in the fluorescent molecular wire. This amendment is supported at least at page 14, lines 18 to 22 of the present specification. New claim 8 is supported at least at page 8, lines 4 to 9 and page 15, lines 11 to 13 of the present specification. Claims 2-5 and 7 have been amended for consistency. No new matter has been added to the application by the foregoing amendments.

At pages 2-3 of the Office Action of July 20, 2009, claims 1-7 were rejected under 35 U.S.C. §103(a) as being obvious over Kim et al., "Ion-Specific Aggregation in Conjugated Polymers: Highly Sensitive and Selective Fluorescent Ion Chemosensors", *Angew. Chem. Int. Ed.* (2000) 39, No. 21, 3868-3872, in view of Naemura et al., "Temperature Dependent Reversal of Enantiomer Selectivity in the Complexation of Optically Active Phenolic Crown Ethers with Chiral Amines", *Chem. Commun.* (1996) 2749-2750. This rejection was maintained in the Advisory Action of October 7, 2009. For brevity, the reasons for rejection are not repeated herein, but reference is made to the Office Action and Advisory Action for the full reasons for rejection.

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As reiterated by the Supreme Court in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, 82 U.S.P.Q.2d 1385 (2007), the framework for the objective analysis for determining obviousness under 35 U.S.C. §103 is stated in *Graham v. John Deere*. Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg., No. 195 (October 10, 2007) at page 57527 (hereinafter "Examination Guidelines"). The factual inquiries enunciated by the Court are as follows:

- (1) Determining the scope and content of the prior art;
- (2) Ascertaining the differences between the claimed invention and the prior art; and

(3) Resolving the level of ordinary skill in the pertinent art.

Examination Guidelines at page 57527.

In response to the rejection, Applicants submit herewith the Declaration of Dr. Yoshito Tobe (hereinafter "Declaration"). Dr. Tobe obtained a Bachelor of Engineering degree from Osaka University in 1974, a Master of Engineering degree from Osaka University in 1976, and a Ph.D. degree in Engineering (in synthetic chemistry) from Osaka University in 1979. Declaration at paragraph 1. From 1979-1983, Dr. Tobe was a Research Associate with the Faculty of Engineering Science at Osaka University. From 1983-1992, Dr. Tobe was an Assistant Professor with the Faculty of Engineering Science at Osaka University. From 1992-1998, Dr. Tobe was an Associate Professor with the Faculty of Engineering Science at Osaka University. From 1998 to the present, Dr. Tobe has been a Professor in the Graduate School of Engineering Science at Osaka University. Declaration at paragraph 2. Dr. Tobe's primary work has included creating new materials which have novel structures, and to reveal the properties based upon structural features, including projects relating to Extended pi-Electron Systems and Precise Molecular Recognition. Declaration at paragraph 3.

Dr. Tobe is familiar with the subject matter of U.S. Application Serial No. 10/590,920, of which he is an inventor. Also, he is familiar with the rejection of claims 1-7 under 35 U.S.C. §103(a) as being unpatentable over Kim et al., "Ion-Specific Aggregation in Conjugated Polymers: Highly Sensitive and Selective Fluorescent Ion Chemosensors", *Angew. Chem. Int. Ed.* (2000) 39, No. 21, 3868-3872, in view of Naemura et al., "Temperature Dependent Reversal of Enantiomer Selectivity in the Complexation of Optically Active Phenolic Crown Ethers with Chiral Amines", *Chem. Commun.* (1996) 2749-2750. Declaration at paragraph 4.

In response to this rejection, Dr. Tobe has set forth his opinion and comments below:

In Naemura et al., for sensing the enantiomer selectivity, the absorption of light, which is proportional to the rate of the complexation of crown ether with a chiral amine, is measured. Declaration at paragraph 5. In Kim et al., for sensing the ion, the aggregation phenomenon of the host molecules is measured as the absorbance or the fluorescence quenching,

but it cannot be expected what is proportional to the aggregation. Declaration at paragraph 5. On the other hand, in the present invention, the quenching behavior in emission of the host polymer molecule is measured for sensing the enantiomer selectivity, and the quenching behavior is not associated with the aggregation of the host polymer molecule. Declaration at paragraph 5. In Dr. Tobe's opinion, one having ordinary skilled in the art can easily understand that the absorption phenomenon, the aggregation phenomenon, and the quenching phenomenon are different. Declaration at paragraph 5. Thus, the sensing mechanisms in Naemura et al., Kim et al., and the present invention are completely different from each other. Declaration at paragraph 5.

The Office Action asserted that there is motivation to combine the molecular structure capable of realizing the absorption of light which is proportional to the complexation rate (i.e., the crown ether of Naemura et al.) with the molecular structure capable of inducing the aggregation phenomenon of sensor molecules (i.e., the polymer of Kim et al.), thereby designing a chiral sensor in which the absorption of light, which is proportional to the complexation, or the aggregation phenomenon is not utilized for sensing. Declaration at paragraph 5. However, the Office Action does not explain why one having ordinary skill in the art has motivation to combine such different sensing mechanisms (i.e., the absorption of light and the aggregation phenomenon) so as to sense the chirality by using further different sensing mechanism, that is, the quenching in emission of the fluorescent molecular wire. Declaration at paragraph 5.

In Dr. Tobe's opinion, in order to achieve a high sensitivity that could not have been attained by conventional low molecular weight sensors, one having ordinary skilled in the art would not have reasonably been expected to combine the sensing mechanisms of Naemura et al. and Kim et al. Declaration at paragraph 5. In general, when the sensing method with a high sensitivity is employed, the sensing has to be performed in the condition of low concentration of the target or sensor molecule, so that the complexation rate tends to be lowered. Declaration at paragraph 5. Therefore, in Dr. Tobe's opinion, one having ordinary skilled in the art does not design a molecular sensor with a high sensitivity based on the sensing method utilizing the absorption and emission phenomena which are proportional to the complexation rate. Declaration at paragraph 5. That is, there is no motivation to combine the molecular structure of

Naemura et al. with polymer of Kim et al. Declaration at paragraph 5.

Furthermore, as seen from new claim 8, the fluorescent molecular wire of the present invention has also an improved asymmetry recognition ability compared to a monomeric compound having the same structure as the optically active substituent. Declaration at paragraph 5. To this day, there is no generally accepted theory for the improved effect of the asymmetry recognition ability. Declaration at paragraph 5. Therefore, in Dr. Tobe's opinion, the fluorescent molecular wire of the present invention would not have been obvious over Naemura et al. and Kim et al. Declaration at paragraph 5. This feature of the present invention can be explained with reference to Fig. 4 of the present specification (see Example 18 on pages 36 to 37). Declaration at paragraph 5.


In particular, the features of the present invention recited in new claim 8 are (i) enhancement of detection sensitivity for a substrate to be detected, (ii) achievement of signal conversion to increase selectivity of chiral sensor at the chiral recognition site compared to the corresponding monomer and to amplify the increased asymmetry selectivity, and (iii) simultaneous achievement of (i) and (ii). Declaration at paragraph 5. In view of the technical level at the filing date of the present invention, in Dr. Tobe's opinion, it would not have been easy to achieve even the feature (i), and even more the feature (ii). Declaration at paragraph 5.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the §103 rejection of claims 1-7. Applicants assert that new claim 8 is distinguishable from the cited references set forth in the Office Action.

Application No. 10/591,920
Paper Dated: November 19, 2009
In Reply to USPTO Correspondence of July 20, 2009
and Advisory Action of October 7, 2009
Attorney Docket No. 3274-060290

Reconsideration of the rejections and allowance of pending claims 1-8 are respectfully requested. The undersigned respectfully requests that the Examiner contact her with any questions regarding this Amendment, in an effort to move this case towards allowance.

Respectfully submitted,
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